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IN THE CLAIMS

1. (Currently amended) A disk array apparatus comprising:

a host adapter for transferring data between a host system and the disk array apparatus;

a cache memory for storing data written from the host adapter;

a storage device adapter for executing control to write data to the cache memory or to read data from the cache memory;

a control memory to which control information is to be written by the host adapter and the storage device adapter;

a plurality of kinds of storage devices to which data are to be written on the basis of control by the storage device adapter; and

a data movement control part provided in the storage device adapter,

the host adapter creating a plurality of logical devices on the basis of storage areas of the plurality of kinds of storage devices, and executing control to cause the plurality of logical devices to be objects to be accessed from the host system, said plurality of logical devices including first and second logical devices,

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the data movement control part executing control, when
the host adapter receives an access control command to ~~specify~~
~~an access operation to a~~ set/change an access attribute of the
first logical device ~~included in the plurality of logical~~
~~devices~~, to move data ~~associated with~~ from the first logical
device to the second logical device ~~among a plurality of~~
~~storage devices that are different in reliability from one~~
~~another and are included in the plurality of kinds of storage~~
~~devices, according to the content of the specified access~~
~~operation~~,

wherein the plural kinds of storage devices differ from
each other in reliability,

wherein the first logical device includes storage areas
of a first one of said plural kinds of storage devices, and
the second logical device includes storage areas of a second
one of said plural kinds of storage devices that has a
different reliability than that of said first one of said
plural storage devices,

wherein the access attribute set/changed for the first
logical device is one of an enable attribute and a disable
attribute by which the first logical device is respectively
enabled or disabled for an access, and

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    wherein the data movement control part executes control

to move data from the first logical device to the second

logical device in response to the setting/changing of the

access attribute of the first logical device according to the

access control command, so as to move the data to storage

areas of different reliability.

    2.   (Canceled)

    3.   (Currently amended)   A disk array apparatus according

to claim [[2]] 1, wherein the plurality of kinds of storage

devices include a first storage device having a first

attribute and a second storage device having a second

attribute.

    4.   (Currently amended)   A disk array apparatus according

to claim 3, wherein the data movement control part moves data

stored in the first storage logical device to the second

storage logical device when an access operation relative to

the data is limited the attribute of the first logical device

is set/changed to the disable attribute by [[an]] the access

control command.

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5.   (Currently amended)   A disk array apparatus according to claim 4, wherein the data movement control part moves the data stored in the second ~~storage~~ logical device to the first ~~storage~~ logical device when ~~limitation of the access operation relative to the data is released~~ the disable attribute of the first logical device changed to the enable attribute by the access control command.

6.   (Currently amended)   A disk array apparatus according to claim 5, wherein when an access operation relative to the data stored in the first ~~storage~~ logical device is limited by an access control command setting/changing the attribute of the first logical device to the disable attribute, the data movement control part moves the data to the second ~~storage~~ logical device after a preset ~~predetermined~~ time has elapsed.

7.   (Currently amended)   A disk array apparatus ~~according to claim 5,~~ comprising:
    a host adapter for transferring data between a host system and the disk array apparatus;
    a cache memory for storing data written from the host adapter;

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a storage device adapter for executing control to write

data to the cache memory or to read data from the cache

memory;

a control memory to which control information is to be

written by the host adapter and the storage device adapter;

a plurality of kinds of storage devices to which data are

to be written on the basis of control by the storage device

adapter;

a data movement control part provided in the storage

device adapter,

the host adapter creating a plurality of logical devices

on the basis of storage areas of the plurality of kinds of

storage devices and executing control to cause the plurality

of logical devices to be objects to be accessed from the host

system,

the data movement control part executing control, when

the host adapter receives an access control command to specify

an access operation to a first logical device included in the

plurality of logical devices, to move data associated with the

first logical device among a plurality of storage devices that

are different in reliability from one another and are included

in the plurality of kinds of storage devices, according to the

content of the specified access operation,

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wherein the access control command has a data
manipulation preventing function,

wherein the plurality of kinds of storage devices include
a first storage device having a first attribute and a second
storage device having a second attribute,

wherein the data movement control part moves data stored
in the first storage device to the second storage device when
an access operation relative to the data is limited by an
access control command,

wherein the data movement control part moves the data
stored in the second storage device to the first storage
device when limitation of the access operation relative to the
data is released by the access control command,

wherein the access control command includes a first
access control command which applies a relatively larger
limitation to the access operation and a second access control
command which applies a relatively smaller limitation to the
access operation,

the data movement control part:

(1) moves the data stored in the first storage device to the
second storage device when the access operation relative to
the data is limited by the first access control command, and

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(2) moves the data stored in the first storage device to the

second storage device after a preset predetermined time has

elapsed, when the access operation relative to the data is

limited by the second access control command.

        8.   (Currently amended) A disk array apparatus ~~according~~

~~to claim 5,~~ comprising:

        a host adapter for transferring data between a host

system and the disk array apparatus;

        a cache memory for storing data written from the host

adapter;

        a storage device adapter for executing control to write

data to the cache memory or to read data from the cache

memory;

        a control memory to which control information is to be

written by the host adapter and the storage device adapter;

        a plurality of kinds of storage devices to which data are

to be written on the basis of control by the storage device

adapter;

        a data movement control part provided in the storage

device adapter,

        the host adapter creating a plurality of logical devices

on the basis of storage areas of the plurality of kinds of

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storage devices and executing control to cause the plurality

of logical devices to be objects to be accessed from the host

system,

the data movement control part executing control, when

the host adapter receives an access control command to specify

an access operation to a first logical device included in the

plurality of logical devices, to move data associated with the

first logical device among a plurality of storage devices that

are different in reliability from one another and are included

in the plurality of kinds of storage devices, according to the

content of the specified access operation,

wherein the access control command has a data

manipulation preventing function,

wherein the plurality of kinds of storage devices include

a first storage device having a first attribute and a second

storage device having a second attribute,

wherein the data movement control part moves data stored

in the first storage device to the second storage device when

an access operation relative to the data is limited by an

access control command,

wherein the data movement control part moves the data

stored in the second storage device to the first storage

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<u>device when limitation of the access operation relative to the
data is released by the access control command,</u>

wherein the access control command includes a first
access control command which applies a relatively larger
limitation to the access operation and a second access control
command which applies a relatively smaller limitation to the
access operation,

the second storage device including an upper-side second
storage device and a lower-side second storage device,

the data movement control part:

(1) moves the data stored in the first storage device to the
lower-side second storage device when the access operation
relative to the data is limited by the first access control
command, and

(2) when the access operation relative to the data stored in
the first storage device is limited by the second access
control command, moves the data to the upper-side second
storage device, and after a preset predetermined time has
elapsed, moves the data back to the lower-side second storage
device.

9.   (Original) A disk array apparatus according to claim
5, wherein a management table which temporarily manages a

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limitation content of the access operation when the host

adapter receives the access control command is constructed in

the control memory, the data movement control part controlling

movement of the data by referring to the management table.

10. (Original) A disk array apparatus according to

claim 5, wherein the access control command controls the

access operation in units of logical devices created on the

basis of storage areas of the plurality of kinds of storage

devices, the data movement control part moving data in units

of the logical devices.

11. (Original) A disk array apparatus according to

claim 5, wherein the access control command includes at least

one of a write inhibit command and a write and read inhibit

command.

12. (Currently amended) A disk array apparatus

according to claim 7 ~~or 8~~,

wherein the first access control command is a write and

read inhibit command, while the second control command is a

write inhibit command.

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13. (Previously presented) A disk array apparatus according to claim 5, wherein the first storage device is a storage device having a relatively higher performance, while the second storage device is a storage device having a relatively lower performance.

14. (Original) A disk array apparatus according to claim 5, wherein the first storage device is an internal storage device existing inside the disk array apparatus, while the second storage device is an external storage device existing outside the disk array apparatus.

15. (Previously presented) A disk array apparatus according to claim 8, wherein the first storage device is a storage device having a relatively higher performance, the upper-side second storage device is a storage device having a relatively medium performance, and the lower-side second storage device is a storage device having a relatively lower performance.

16. (Currently amended) A control method for a disk array apparatus including a host adapter for transferring data between a host system and the disk array apparatus, a cache

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memory for storing data written from the host adapter, a

storage device adapter for executing control to write data to

the cache memory or to read data from the cache memory, a

control memory to which control information is to be written

by the host adapter and the storage device adapter, a first

storage device and a second storage device to which data are

to be written on the basis of control by the storage device

adapter and which have different attributes, respectively, the

host adapter creating a plurality of logical devices on the

basis of storage areas of the first and second storage devices

and executing control to cause the plurality of logical

devices to be objects to be accessed from the host system,

<u>said plurality of logical devices including first and second</u>

<u>logical devices,</u> the control method comprising:

a reception decision step of determining whether an

access control command ~~indicative of an access operation to a~~

<u>setting/changing an access attribute of the</u> first logical

device ~~included in the plurality of logical devices~~ has been

received from the host system;

a moving step of, ~~when~~ <u>in response to determining that</u>

<u>the received access control command sets/changes</u> the access

~~operation to data associated with~~ <u>attribute for</u> the first

logical device is ~~limited by the access control command~~ <u>to a</u>

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disable attribute by which the first logical device is

disabled for an access, moving the data from the first ~~storage~~

logical device to the second ~~storage~~ logical device; and

a restoring step of restoring the data moved to the

second ~~storage~~ logical device to the first ~~storage~~ logical

device, ~~when limitation of the access operation is released~~ in

response to determining that the received access control

command changes the disable attribute of the first logical

device to the enable attribute by which the first logical

device is enabled for an access ~~by the access control command~~.

17.   (Currently amended) A control method for the disk

array apparatus according to claim 16, wherein the moving step

moves the data ~~stored in the first storage device~~ from the

first ~~storage~~ logical device to the second ~~storage~~ logical

device after a preset ~~predetermined~~ time has elapsed, when the

~~access operation relative to the data is limited~~ attribute is

set/changed to the disable attribute by the access control

command.

18.   (Currently amended) A control method for [[the]] a

disk array apparatus ~~according to claim 16,~~ including a host

adapter for transferring data between a host system and the

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disk array apparatus, a cache memory for storing data written from the host adapter, a storage device adapter for executing control to write data to the cache memory or to read data from the cache memory, a control memory to which control information is to be written by the host adapter and the storage device adapter, a first storage device and a second storage device to which data are to be written on the basis of control by the storage device adapter and which have different attributes, respectively, the host adapter creating a plurality of logical devices on the basis of storage areas of the first and second storage devices and executing control to cause the plurality of logical devices to be objects to be accessed from the host system, the control method comprising:

a reception decision step of determining whether an access control command indicative of an access operation to a first logical device included in the plurality of logical devices has been received from the host system;

a moving step of, when the access operation to data associated with the first logical device is limited by the access control command, moving the data from the first storage device to the second storage device; and

a restoring step of restoring the data moved to the second storage device to the first storage device when

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limitation of the access operation is released by the access
control command,

wherein the access control command includes a first
access control command which applies a relatively larger
limitation to the access operation and a second access control
command which applies a relatively smaller limitation to the
access operation,

the moving step comprising:

(1) moving the data stored in the first storage device from
the first storage device to the second storage device when the
access operation relative to the data is limited by the first
access control command, and

(2) moving the data stored in the first storage device from
the first storage device to the second storage device after a
preset predetermined time has elapsed, when the access
operation relative to the data is limited by the second access
control command.

19. (Currently amended) A control method for [[the]] a
disk array apparatus including a host adapter for transferring
data between a host system and the disk array apparatus, a
cache memory for storing data written from the host adapter, a
storage device adapter for executing control to write data to

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the cache memory or to read data from the cache memory, a

control memory to which control information is to be written

by the host adapter and the storage device adapter, a first

storage device and a second storage device to which data are

to be written on the basis of control by the storage device

adapter and which have different attributes, respectively, the

host adapter creating a plurality of logical devices on the

basis of storage areas of the first and second storage devices

and executing control to cause the plurality of logical

devices to be objects to be accessed from the host system, the

control method comprising:

a reception decision step of determining whether an

access control command indicative of an access operation to a

first logical device included in the plurality of logical

devices has been received from the host system;

a moving step of, when the access operation to data

associated with the first logical device is limited by the

access control command, moving the data from the first storage

device to the second storage device; and

a restoring step of restoring the data moved to the

second storage device to the first storage device when

limitation of the access operation is released by the access

control command ~~according to claim 16~~,

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wherein the access control command includes a first access control command which applies a relatively larger limitation to the access operation and a second access control command which applies relatively smaller limitation to the access operation,

the second storage device including an upper-side second storage device and a lower-side second storage device,

the moving step comprises:

(1) moving the data stored in the first storage device from the first storage device to the lower-side second storage device when the access operation relative to the data is limited by the first access control command, and

(2) when the access operation relative to the data stored in the first storage device is limited by the second access control command, moving the data from the first storage device to the upper-side second storage device, and after a preset predetermined time has elapsed, moving the data from the upper-side second storage device back to the lower-side second storage device.

20. (Original) A control method for the disk array apparatus according to claim 16, wherein the access control command controls the access operation in units of logical

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devices created on the basis of storage areas of the storage

devices, each of the moving step and the restoring step moving

data in units of the logical devices.

21. (New) A disk array apparatus comprising:

a disk controller having a host adapter for transferring

data between a host system and the disk array apparatus, a

cache memory, and a storage device adapter for executing

control to write data to the cache memory or to read data from

the cache memory, wherein the cache memory stores data written

from the host adapter and control information to be written by

the host adapter and the storage device adapter; and

a plurality of kinds of storage devices to which data are

to be written under control of the storage device adapter;

wherein the host adapter has a first logical device of a

first kind and a second logical device of a second kind, and

executes control to cause the first and second logical devices

to be objects to be accessed from the host system,

wherein the plural kinds of storage devices differ from

each other in reliability,

wherein the first logical device includes storage areas

of a first one of said plural kinds of storage devices, and

the second logical device includes storage areas of a second

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one of said plural kinds of storage devices that has a

different reliability than that of said first one of said

plural storage devices,

wherein the disk controller executes control to move data

from the first logical device to the second logical device in

response to the setting/changing of an access attribute of the

first logical device according to an access control command,

so as to move the data to storage areas of different

reliability, and

wherein the access attribute set/changed for the first

logical device is one of an enable attribute and a disable

attribute by which the first logical device is respectively

enabled or disabled for an access.

22.   (New)   A disk array apparatus according to claim 21,

wherein the plurality of kinds of storage devices include a

first storage device having a first attribute and a second

storage device having a second attribute.

23.   (New)   A disk array apparatus according to claim 22,

wherein the disk controller moves data stored in the first

logical device to the second logical device when the attribute

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of the first logical device is set/changed to the disable
attribute by the access control command.

24. (New) A disk array apparatus according to claim 23,
wherein the disk controller moves the data stored in the
second logical device to the first logical device when the
disable attribute of the first logical device is changed to
the enable attribute by the access control command.

25. (New) A disk array apparatus according to claim 24,
wherein when an access operation relative to the data stored
in the first logical device is limited by an access control
command setting/changing the attribute of the first logical
device to the disable attribute, the disk controller moves the
data to the second logical device after a preset time has
elapsed.

26. (New) A disk array apparatus according to claim 24,
wherein the access control command controls the access
operation in units of logical devices created on the basis of
storage areas of the plurality of kinds of storage devices,
the disk controller moving data in units of the logical
devices.

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27. (New) A disk array apparatus according to claim 24,
wherein the access control command includes at least one of a
write inhibit command and a write and read inhibit command.

28. (New) A disk array apparatus according to claim 24,
    wherein the access control command includes a first
access control command which applies a relatively larger
limitation to the access operation and a second access control
command which applies a relatively smaller limitation to the
access operation,
    wherein the disk controller:
(1) moves the data stored in the first logical device to the
second logical device when the access operation relative to
the data is limited by the first access control command, and
(2) moves the data stored in the first logical device to the
second logical device after a preset predetermined time has
elapsed, when the access operation relative to the data is
limited by the second access control command, and
    wherein the first access control command is a write and
read inhibit command, while the second control command is a
write inhibit command.

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29.   (New)   A disk array apparatus according to claim 24,

wherein the access control command includes a first

access control command which applies a relatively larger

limitation to the access operation and a second access control

command which applies a relatively smaller limitation to the

access operation,

wherein the second storage device includes an upper-side

second storage device and a lower-side second storage device,

wherein the disk controller:

(1)   moves the data stored in the first logical device to the

lower-side second storage device when the access operation

relative to the data is limited by the first access control

command, and

(2)   when the access operation relative to the data stored in

the first storage device is limited by the second access

control command, moves the data to the upper-side second

storage device, and after a preset predetermined time has

elapsed, moves the data back to the lower-side second storage

device, and

wherein the first access control command is a write and

read inhibit command, while the second control command is a

write inhibit command.

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30. (New) A disk array apparatus according to claim 24, wherein the first storage device is a storage device having a relatively higher performance, while the second storage device is a storage device having a relatively lower performance.

31. (New) A disk array apparatus according to claim 24, wherein the first storage device is an internal storage device existing inside the disk array apparatus, while the second storage device is an external storage device existing outside the disk array apparatus.

32. (currently amended) A disk array apparatus according to claim 29, wherein the first storage device is a storage device having a relatively higher performance, the upper-side second storage device is a storage device having a relatively medium performance, and the lower-side second storage device is a storage device having a relatively lower performance.

33. (New) A disk array apparatus according to claim 8, wherein the first access control command is a write and read inhibit command, while the second control command is a write inhibit command.

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